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BUFFALO
TRUNK SEWER.

DESCRIPTION, DETAILED SPECIFICA-
TIONS AND CONDITIONS OF
LETTING THE WORK,

AS A BASIS OF CONTRACT.

PREPARED BY THE ORDER OF THE
BOARD OF SEWER COMMISSIONERS

By GEORGE E. WARING, Jr., Consulting Engineer.

DATED JANUARY 24, 1883.

BUFFALO:
THE COURIER COMPANY, PRINTERS.

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THE following specifications, etc., are issued as the official announcement of the Board of Sewer Commissioners of the City of Buffalo of the terms and conditions on which material and labor for the construction of the Trunk Sewer will be contracted for.

For the Board of Sewer Commissioners,

D. C. BEARD, *President*.

BUFFALO, N. Y., January 24, 1883.

BUFFALO TRUNK SEWER.

General conditions attaching to all specifications for the supply of material for, and for the execution of work upon, the construction of the Trunk Sewer and its appurtenances, or any part thereof.

1. Wherever the words "the Engineer" appear in the specifications, they shall be taken to mean, in all cases, the Consulting Engineer of the work, or any subordinate engineer in charge of the part of the work or supply referred to. In case of dispute or doubt between the contractor and the subordinate engineer, reference may be made by either party to the Consulting Engineer, whose decision shall be, in all cases, final.

2. Wherever the words "as indicated" appear in the specifications, they shall be taken to mean, in the manner described in the specifications, or shown in the drawings; or in accordance with the general tenor or intent of either or both of them, or with proper and reasonable deductions therefrom; or according to the decision thereon of "the Engineer," as explained in the foregoing paragraph (1).

BUFFALO TRUNK SEWER.

DESCRIPTION.

This work, as now offered for proposals, will consist of a brick sewer eight feet in interior diameter, beginning at the south side of Albany street and running, as indicated in the drawings, to the intersection of the inlet from the Main and Hamburg Canal on the prolongation of the line of Hamburg street. From this point to the intersection of the Mill Race sewer in Seneca street, near Hydraulic street, its interior diameter will be four feet.

That portion of the sewer which is eight feet in diameter will be built of three rings of brick and of a total thickness of thirteen inches, excepting in one hundred feet of Section B, where it will consist of four rings of brick, and where the wall will have a thickness of seventeen inches.

For proposals the sewer will be divided into the following sections:

	FEET.
Section A, from Station —20 feet, south side of Albany street, to Station 17, north of the Water Works inlet, length, about	1,720
Section B, from Station 17 to Station 22 + 57.2, south of the Water Works inlet, length, about.....	557
Section C, from Station 22 + 57.2 to Station 68, north of Pennsylvania street, length, about	4,543
Section D, from Station 68 to Station 79, south of Hudson street, length, about	1,170
Section E, from Station 79 to Station 137, in Swan street near the Terrace, length, about.....	5,800
Section F, from Station 137 to Station 163, tunnel, length, about	2,600
Section G, from Station 163 to Station 198 + 59, being fifteen (15) feet beyond the chamber forming the junction of the main sewer with the flushing inlet from the head of the Hamburg Canal, length, about	3,559
Section H, from Station 198 + 59 to Station 222 + 76, more or less, being the point of junction of the Trunk sewer with the Mill Race sewer in Seneca street, near Hydraulic street, length, about....	2,417
	<hr style="width: 10%; margin-left: auto; margin-right: 0;"/> About 22,366

	FEET.
Total length of 8-foot sewer, about	19,944
Total length of 4-foot sewer, about.....	2,422
Total length of Trunk sewer, about.....	<hr/> 22,366

DESCRIPTION OF SECTIONS.

- Section A. Open cut near the Erie Canal.
- Section B. Open cut, with special protection against leakage and against filtration from the canal, as indicated, in passing the Water Works.
- Section C. Mainly through The Front and terminating north of the Penitentiary wall.
- Section D. Mainly through the Penitentiary grounds and the Tannery.
- Section E. From a point south of the Tannery through Fourth street, Court street, and the Terrace to the west portal of the tunnel in Swan street.
- Section F. In tunnel under Swan street.
- Section G. From the east portal of the Tunnel to the connection of the Hamburg street inlet, being in open cut in Swan street.
- Section H. Open cut in Swan street and Seneca street.

The rate of fall of Sections A, B, C, D, E, F and G is 1 to 4,656.

The rate of fall of Section H is 1 to 2,000.

APPURTENANCES TO THE DIFFERENT SECTIONS OF THE TRUNK SEWER.

- Section A. Sewer only.
- Section B. Sewer only.
- Section C. Construction for the interception of the sewer in Porter avenue.
Construction for the interception of the sewer in Jersey street.
- Section D. Construction for the interception of the sewer in Pennsylvania street.
Construction for the interception of the sewer in Hudson street.

- Section E. Construction for the interception of the sewer in Maryland street.
 Construction for the interception of the sewer in Virginia street.
 Construction for the interception of the sewer in Carolina street.
 Construction for the interception of the sewer in Georgia street.
 Construction for the interception of the sewers in Court street and Morgan street.
 Construction for the interception of the sewers in Genesee street and Eagle street.
 Construction for the interception of the sewer in Church street.
 Construction of a flushing inlet from Wilkeson Slip.
- Section F. Sewer only.
- Section G. Construction for the interception of the sewer in Spring street.
 Construction of one flushing inlet from the Main and Hamburg Canal at Chicago street, and one flushing inlet from the Main and Hamburg Canal at Hamburg street, as indicated.
- Section H. Construction for the interception of the sewer in Emslie street.
 Construction for the interception of the Mill Race sewer.

ARRANGEMENT OF SECTIONS AND DETAILS, FOR PROPOSALS.

- Section A. Construction of the sewer, including manholes, as indicated; price per lineal foot of the sewer for the work complete, as indicated.
- Section B. Construction of the sewer, including manholes, as indicated; price per lineal foot for the work complete, as indicated.
- Section C. Construction of the sewer, including manholes, as indicated; price per lineal foot for the work complete, as indicated; also, price for all additional works connected with the interception of each of the sewers to be intercepted, as indicated.

- Section D. Construction of the sewer, including manholes, as indicated; price per lineal foot for the work complete, as indicated; also price for all additional works connected with the interception of each of the sewers to be intercepted, as indicated.
- Section E. Construction of the sewer, including manholes, as indicated; price per lineal foot for the work complete, as indicated, omitting such part of the same as includes the cut-stone work indicated for the junction of the Wilkeson Slip inlet with the Trunk Sewer; also, price for all additional works connected with the interception of each of the sewers to be intercepted, as indicated; also, price for the gate chamber and gates complete, as indicated; also, price per lineal foot for the connecting sewer between the said gate chamber and the point where the line of the outer wall of the said connecting sewer first joins the line of the outer wall of the Trunk Sewer; also, price for the junction of the said connecting sewer with the Trunk Sewer, including the cut-stone masonry, all being complete, as indicated.
- Section F. Construction of the sewer, including manholes, as indicated; price per lineal foot for the work complete, as indicated; manholes in this section to be constructed only where shafts have been sunk for the tunnel work.
- Section G. Construction of the sewer, including manholes, as indicated; price per lineal foot for the work complete, as indicated, omitting such part of the same as includes the cut-stone work indicated for the junction of the Chicago street inlet with the Trunk Sewer; also, price for all additional works connected with the interception of each of the sewers to be intercepted, as indicated; also, price for the gate chamber (Chicago street inlet) and gates complete, as indicated; also, price per lineal foot for the connecting sewer (Chicago street inlet) between the said gate chamber and the point where the line of the outer wall of the said connecting sewer first joins the line

of the outer wall of the Trunk Sewer; also, price for the junction of the said connecting sewer with the Trunk Sewer, including the cut-stone masonry, all being complete, as indicated; also, price for the gate chamber and gates complete for the Hamburg street inlet; also, price per lineal foot for the connecting sewer between the said gate chamber and the distributing chamber in Swan street; also, price for the distributing chamber and triple inlet complete, including the connection of the 8-foot sewer with the 4-foot sewer and the construction of five feet of the said 4-foot sewer, as indicated.

Section II. Construction of the sewer, including manholes, as indicated; price per lineal foot for the work complete, as indicated; also, price for all additional works connected with the interception of the sewer in Emslie street, as indicated; also, price for the construction of the interception works, including the cut-stone weir at Mill Race sewer complete, as indicated.

BUFFALO TRUNK SEWER.

TO BIDDERS.

General Conditions:

Separate bids are to be made on each of the sections of the work as given herewith; but no bid will be entertained which proposes to execute only a portion of the work of a section. For example: The Hamburg street inlet cannot be bid for by itself, but only as a part of Section G.

Bidders will not be required to submit proposals for the construction of the whole work; but notice is hereby given that if a bidder, otherwise satisfactory to the Board of Sewer Commissioners, submits proposals for the construction of all of the sections from A to H inclusive, except perhaps Section F (Tunnel), the contract may be awarded to him, although the sum total of his bids for the different sections may amount to more than the aggregate of the lowest bids for all of the sections selected from among different bidders.

Specific Conditions of Proposals:

Proposals must be for furnishing all material and executing all work in connection with the construction of the Trunk Sewer and its appurtenances as indicated for each section, it being understood that all bricks, cement and iron castings shall be purchased from the Board of Sewer Commissioners, at the following prices:

Sewer bricks, per thousand,.....	\$.....
American Hydraulic Cement, per barrel,	\$.....
Portland Cement, per barrel, average gross weight, 400 pounds	\$.....
Iron castings, per pound,.....	...cents.

It is also understood that all other material of whatever kind, may be bought in the open market, subject to inspection and approval by the Engineer.

Estimates for furnishing said material, and for executing said work will be received by the Board of Sewer Commissioners of the City of Buffalo, at the rooms of the Park Commissioners, in the City Hall, Buffalo, N. Y., until twelve o'clock, noon, on Tuesday, the twentieth day of February, 1883; at which time and place the bids will be publicly opened and read. The award of the contract, if awarded, will be made as soon as practicable after the opening of the bids.

Any person making an estimate shall furnish the same in a sealed envelope to the said Board, at the said office, on or before the day and hour above named, which envelope shall be indorsed with the name or names of the person or persons presenting the same, the date of its presentation, and a statement of the section of the work to which it relates.

The bidder to whom the award is made shall give security for the faithful performance of the contract, in the manner prescribed and required herein, in a sum equal to twenty-five per cent. (25 %) of the total amount of the bidder's proposal.

The following are the provisions of the act of Legislature, under which the Trunk Sewer is to be constructed, so far as they relate to this subject. It is entitled:

"AN ACT to create a Board of Commissioners of Sewers of the City of Buffalo, to define their powers and duties, and to provide means for the construction and maintenance of certain sewers in the City of Buffalo, passed June 8, 1882. * * * * *

“Said Commissioners shall advertise for proposals for constructing said sewers and tunnel, and furnishing material for the same, under one entire contract, or in parts or sections under several contracts, as they shall deem for the best interests of the city, for a period of not less than ten days, in the official paper, and in at least one newspaper printed in Boston, New York, Cleveland, Cincinnati, Chicago and St. Louis. The said Commissioners shall require a bond of each person who shall submit proposals in such amount and with such sureties as they shall determine, to be submitted with such proposals, conditioned that the person or persons making such proposals shall enter into a contract for furnishing the labor and materials for and constructing such sewers and tunnel, or the portion thereof for which such proposals are asked and submitted, according to the plans and specifications, at his proposal or bid, and that he will furnish such security as said board shall require to be furnished for the faithful performance of his or their contract.

“And said Commissioners shall require any person or persons with whom they shall contract for doing said work or furnishing said materials, or any part thereof, to give sufficient security, to be approved by them, for the faithful performance of such contract or contracts. Said Commissioners may reject any and all proposals and bids which may be made to them, and may contract with other than the lowest bidder for such materials and work, or any part thereof, and may re-advertise for the same. Said Commissioners are hereby authorized to expend a sufficient amount of money to perform all the duties imposed upon them by this act.”

The whole amount of the material to be furnished, and of the work to be executed, must conform in every respect to the specifications therefor which are attached hereto, the same being subject to the limitations and restrictions of the “Special Stipulations” attaching to Specifications, and published herewith.

The form, provisions and requirements to be complied with by the Contractor are set forth in the blank “Form of Agreement.”

Bidders will state in their proposals the price for furnishing materials and for executing the work for each section, in the form prescribed in the blank Proposals, the same to be in all respects in conformity with the specifications and as indicated. They will also state the total sum for which they will furnish the materials and execute the work for constructing all of the details included in the section bid for, the same being the accurate sum of the products of the various quantities and prices as set forth in the details of the bid. By this total sum the bids will be tested. The price and sum bid are to cover all expenses and charges of every kind involved in or incidental to the furnishing of all material, and the execution of

all work in full compliance with the specifications, and as indicated, including any claim that may arise through delay from any cause in procuring material or in performing work, excepting only delay in receiving material to be furnished by the Board of Sewer Commissioners, and for which requisition has been duly made.

Bidders will distinctly write out both in figures and in words all prices and amounts set forth in their proposals.

Should the accepted bidder or bidders neglect or refuse to accept the contract within forty-eight (48) hours after written notice, that the same has been awarded to his or their bid or estimate, or if, after acceptance, he or they should refuse or neglect to execute the contract and give the proper security, for five (5) days after notice that the contract is ready for execution, he or they will be considered to have abandoned it, and as in default to the City of Buffalo, and the contract may be let to another bidder. The written notices herein provided for shall date from the time of their being deposited in the Post-office in the City of Buffalo, addressed to the bidder at his place of residence, as specified in his proposal, or to such other address as he shall have designated for the purpose.

Bidders are required to state in their proposals their names and places of residence; the names of all persons interested with them therein; and if no other person be so interested, the proposal shall distinctly state that fact; also that the proposal is made without any connection with any other person making a proposal for the same work, and that it is in all respects fair and without collusion or fraud; and also that no member of the Common Council, Head of a Department, Chief of a Bureau, Deputy thereof, or Clerk therein, or other officer of the corporation, or officer or member of the Board of Sewer Commissioners, is directly or indirectly interested therein, or in the supplies or work to which it relates, or in any portion of the profits thereof; which proposal must be verified by the oath, in writing, of the party making the proposal, that the several matters stated therein are in all respects true. *Where more than one person is interested, it is requisite that the verification be made and subscribed by all the parties interested.*

Each bid shall be accompanied by the consent, in writing, of two householders or freeholders of the State of New York, with their respective places of business or residence, to the effect that if the contract be awarded to the person or persons making the bid, they

will, upon its being so awarded become bound as his or their sureties for its faithful performance; and that if the said person or persons shall omit or refuse to execute the contract, they will pay to the City of Buffalo any difference between the sum to which he or they would be entitled on its completion, and that which the City of Buffalo may be obliged to pay to any bidder to whom this contract may be awarded at any subsequent letting. The consent above mentioned shall be accompanied by the oath or affirmation, in writing, of the persons signing the same, that each is a householder or freeholder of the State of New York, and is worth the amount of the security required for the above work, over and above all his debts of every nature, *and over and above his liabilities as bail, surety or otherwise*; and that he has offered himself as surety in good faith and with the intention to execute the bond required by law.

The adequacy and sufficiency of the security offered is to be determined by the Board of Sewer Commissioners, after the award is made and prior to the signing of the contract.

Bidders are informed that no deviation from the specifications will be allowed unless under the written instructions of the Engineer. No additional compensation shall be allowed for such deviation.

No bid will be accepted from, or contract awarded to, any person who is in arrears to the City of Buffalo, upon debt or contract, or who is a defaulter as surety or otherwise, upon any obligation due the said city.

The right is reserved to decline all bids and to award the contract to other than the lowest bidder.

A copy of the specifications, including the terms and manner of payment, is published herewith.

Bidders are requested, in making their bids or estimates, to use the blanks prepared for that purpose by the Board of Sewer Commissioners, a copy of which, together with the form of agreement, can be obtained upon application therefor at the office of the Park Commissioners.

D. C. BEARD,
JACOB SCHEU,
MICHAEL NELLANY,
GEO. B. MATHEWS,
GEO. GORHAM,

} *The Board of Sewer
Commissioners of
the City of Buf-
falo.*

Dated January 24th, 1883.

BUFFALO TRUNK SEWER.

SPECIAL STIPULATIONS.

1. The Contractor shall not assign or transfer the contract or sublet any of the work embraced in it without the written consent of the Board of Sewer Commissioners.

2. The Contractor shall begin the work at such points as the Engineer may direct, and shall conform to his directions as to the order of time in which the different parts of the work shall be done, as well as to all his other instructions as to the mode of doing the same.

3. Whenever the Contractor is not present on the work, orders will be given to the Superintendents or Overseers who may have immediate charge thereof, and shall by them be received and strictly obeyed. And if any person employed on the work shall refuse or neglect to obey the directions of the Engineer or his duly authorized agent, in anything relating to the work, or shall appear to the said Engineer to be incompetent, disorderly, vicious or unfaithful, he shall, upon the requirement of the said Engineer, be at once discharged and not again employed on any part of the work.

4. Any work not herein specified which may be fairly implied as included in the contract, of which the Engineer shall judge, shall be done by the Contractor without extra charge.

5. The Contractor will be required to observe all city ordinances in relation to obstructing streets, maintaining signals, keeping open passage-ways and protecting the same where exposed, and generally to obey all laws and ordinances controlling or limiting those engaged on the works, and the said Contractor expressly binds himself to indemnify and save harmless the City of Buffalo from all suits or actions of every name and description brought against the said city for or on account of any injuries or damages received or sustained by any party or parties by or from the acts of the said Contractor or his servants or agents in doing the work herein contracted for, or by or in consequence of any negligence in guarding the same, or any improper materials used in its construction, or by or on account of any act or omission of the said Contractor or his servants or agents; and it is hereby further agreed that so much of the money due to the said Contractor under and by virtue of the agreement as shall be considered necessary by the Board of Sewer

Commissioners may be retained by it until all suits or claims for damages as aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the said Board.

6. The Board of Sewer Commissioners shall have the right to make alterations in the location, line, grade, plan, form or dimensions of the work herein contemplated either before or after the beginning of the work. If such alterations diminish the quantity of work to be done, they shall not constitute a claim for damages or for anticipated profits on the work dispensed with; if they increase the amount of work, such increase shall be paid for according to the quantity actually done in equitable proportion to the rate provided to be paid under the contract.

7. The Contractor shall not be entitled to any claim for damages for any hindrance or delay from any cause whatever in the progress of the work or any portion thereof; but such hindrance may entitle said Contractor to an extension of the time for completing this contract sufficient to compensate for the detention, the same to be determined by the Engineer, provided he (the Engineer) shall have immediate notice in writing of the cause of detention and shall consider such cause sufficient.

8. The work embraced in the contract shall be begun within two weeks after written notice so to do shall have been given to the Contractor by the Engineer, and carried on regularly and uninterruptedly thereafter (unless the said Engineer shall otherwise, in writing, specially direct), with such a force as to secure its full completion on or before the thirty-first day of December, 1884, the time of beginning, rate of progress, and time of completion being essential conditions of the contract. And if the Contractor shall fail to complete the work by the time above specified, a sum equal to one-tenth (1-10) of one per cent. of the whole sum agreed to be paid under this contract for each and every day thereafter, until such completion, shall be deducted from the moneys payable under this contract.

9. It is further specially agreed that if at any time the Engineer shall be of opinion that the work is unnecessarily delayed and will not be finished within the prescribed time, he shall notify the Contractor in writing to that effect. And if the Contractor shall not within five days thereafter take such measures as will, in the judgment of the said Engineer, insure the satisfactory completion of the work, the said Engineer may thereupon, by and with the consent of the Board of Sewer Commissioners, notify the said Contractor to dis-

continue all work under the contract; and it is hereby agreed that the said Contractor shall immediately respect said notice and stop work and cease to have any rights to possession of the ground. The Engineer may thereupon, under direction of the Board of Sewer Commissioners, place such force as he may deem advisable, at work to complete the work, and use such materials as he may find upon the line of the work, or procure other materials for the completion of the same, and charge the expense of said labor and materials to the Contractor; and the expense so charged shall be deducted and paid by the Contractor out of such moneys as may be then due, or may afterwards become due, to the said Contractor under and by virtue of the agreement; and in case such expense is less than the sum which would have been payable under the contract if the same had been completed by the Contractor, then said Contractor shall be entitled to receive the difference; and in case such expense is greater, then the said Contractor or his bondsmen shall pay the amount of such excess so due.

And if the Contractor shall assign the contract without the consent of the Board of Sewer Commissioners, or shall abandon the work, or shall neglect or refuse to comply with the instructions of the Engineer relative thereto, or shall fail in any manner to comply with the specifications or stipulations herein contained, the Board of Sewer Commissioners shall have the right to annul and cancel the contract, and to relet the work or any part thereof, and such annulment shall not entitle the Contractor to any claim for damages on account thereof, nor shall it affect the right of the city to recover damages which may arise from such failure.

10. In any case of dispute between Contractors on adjoining sections, as to the manner of connecting the work, or otherwise, the Engineer shall, in all cases, decide.

11. In the construction along and through "The Front" the contractor will be required to conform to the rules and regulations adopted, or to be adopted, by the Park Commissioners.

CITY OF BUFFALO.

SPECIFICATIONS FOR THE CONSTRUCTION OF TRUNK SEWER AND APPURTENANCES.

The Trunk Sewer to be of brick and stone masonry on the location shown on the plan of the work, and according to lines and grades, as indicated, and to be given by the Engineer. All man-

holes and all structures for interception and overflow and for flushing inlets and for other purposes, as indicated, to be completely constructed and finished, and the street or other ground to be entirely restored as provided in these specifications. All brick, cement, and iron castings to be bought by the Contractor from the Board of Sewer Commissioners.

The sewer is to be built of the materials, sizes and dimensions, with the connections, on the lines, at the depth and in the manner shown on the plans of the work, the same being entitled "Buffalo Trunk Sewer," and bearing the signature of the Consulting Engineer.

LINES, LEVELS AND DIMENSIONS.

All work during its progress and on its completion shall conform truly to the lines, sections and levels given by the Engineer. All work shall be built in accordance with the intent of the plans and specifications, or either of them, of which intent the Engineer shall be the sole judge.

EXCAVATING AND BACK FILLING.

The ground shall be excavated in open trench of the necessary width and depth or in tunnel of the necessary size. The trench, except in rock excavation, shall be opened from the surface of the ground to the level of the horizontal diameter of the sewer to a uniform width of twelve (12) feet. Below this level the ground shall be excavated to the exact curve of the exterior circumference of the sewer, or of other form or depth as the Engineer shall direct. A trench to receive a tile drain shall be excavated to a true line—or if made deeper shall be properly filled to a true line—one foot below the lowest exterior line of the sewer.

The sides of the excavation shall be supported by suitable sheet piling, planking and shoring wherever necessary.

All irregularities in the bottom of the trench shall be filled up to the required level and to the true form of the outside of the sewer, as indicated, with gravel or clean sand, firmly rammed in, or with concrete, as the Engineer shall direct; and where the ground does not afford a sufficiently solid foundation, the Contractor shall excavate the trench to such increased depth as the Engineer may decide to be necessary, and shall then bring it up to the required level and form with such material and in such manner as the Engineer shall determine.

Except north of Station 80, near Hudson street, all excavation shall be executed with the aid of such mechanical apparatus as will obviate the necessity for depositing any excavated material on the surface of the ground—all such material being deposited on the completed structure or discharged directly into carts. All material accidentally spilled on the surface of the ground shall be at once removed. This excavating apparatus shall not at any point occupy a greater width at the surface of the ground than the width of the open trench, not to exceed a total outside width of 12 feet.

No more than 400 feet of trench shall be opened at any one time in advance of the complete building of the sewer and of the completed filling to the surface over the same, unless by written order of the Engineer and for the distance therein specified.

The regrading, repaving, remacadamizing or reconcreting, as the case may be, shall be completed at all times to within 200 feet of the end of the completed brick-work of the sewer, and all surplus earth, sand or rubbish beyond that distance shall be immediately removed.

The Contractor shall not sell or permit to be removed from the line of the work, before the trench shall have been refilled, any building sand or earth thrown up, except upon the written permission of the Engineer, and then only so much as shall remain after reserving a sufficient quantity to refill the trench and complete the paving; but he shall in all cases refill the trench with the same materials thrown out, provided it be good sand, gravel or earth; but if it be unsuitable, consisting of rock, blasting stones, mud, or other improper material, then the said Contractor shall remove the same from the ground, and good, clean earth or sand shall be, by the said Contractor, procured and used for refilling the trench, and he shall cause sand of proper quality and depth to be spread on the surface to receive the repavement.

NOTE.—See also “Backing and Refilling,” page 27.

ROCK EXCAVATION.

When rock is to be excavated it shall be fully taken out 50 feet in advance of the laying of any brick-work and six inches below the outer circumference of the sewer, and to the depth required for the underdrain. The trench shall then be filled to the level of the grade, and to the outer lines of the sewer, with such material

and in such manner as the Engineer shall direct or approve. No extra payment will be made for rock excavation, nor for filling to grade as directed.

In all cases of rock blasting, the blast shall be carefully covered with heavy timber, according to the ordinances of the Common Council relative to rock blasting, and so much of the material so excavated as the Engineer may direct shall be immediately removed from the work.

Where a line of water-pipe intersects the trench, any rock excavation within five feet thereof shall be removed without blasting.

The profiles and sections of rock and other material shown in the drawings are based on careful borings and soundings, and they are believed by the Board of Sewer Commissioners to indicate the true conditions to be encountered. These profiles and sections are given for the information of bidders, but with no guarantee of their accuracy, and no claim for extra compensation will be allowed because of their inaccuracy.

QUICKSAND, ETC.

When running sand, quicksand, or other bad or treacherous ground is encountered, the work shall be carried on with the utmost vigor, and shall be proceeded with day and night, should the Engineer so require.

DRAINING THE WORK.

Under the whole length of the sewer a drain shall be laid at a depth of one foot below its lowest exterior line. This drain shall be made of sound pipes or draining tiles laid with uncemented joints, muslin being wrapped around the joints to exclude silt. This drain shall in all cases be laid at least ten feet in advance of the construction of any part of the sewer, and its flow shall be received in such sumps as the Engineer shall direct, and shall be kept pumped down in such sumps night and day, so that water can never rise into contact with masonry which has not been completed for at least 24 hours. To reduce the amount of pumping as much as possible, the Engineer will order the drain to be stopped and the sump holes in the bottom of the sewer to be built up from time to time as the work progresses; where necessary, in his opinion, however, he may order the drains to be continued in action, pumping

stations to be maintained during the execution of the whole work, and such order shall be complied with without extra charge therefor.

In addition to the above, the Contractor shall, at his own expense, pump out or otherwise remove any water which may be found or which shall accumulate in the trench, and shall form all dams or other works necessary for keeping the excavation clear of water during the progress of the work, without extra charge therefor.

The Contractor shall provide for the flow of sewers, drains or water-courses interrupted during the progress of the work, and shall, when required by the Engineer, restore and make good all connections not lower than the soffit of the sewer, and shall immediately cart away and remove all offensive matter, with such precautions as may be directed by the Engineer.

MORTAR.

Whenever in these specifications the word "mortar" is used without qualification, it shall be taken to mean mortar composed of one (1) part by measure of American hydraulic cement and two (2) parts by measure of clean, sharp sand entirely free from loam. Where cement of another quality, or sand in other proportion, is to be used, the fact is so stated in the specifications. All mortar used on the work shall be carefully and thoroughly mixed dry and wetted up only as needed for immediate use. No mortar which has begun to set shall be retempered for use. The Engineer shall order all such mortar to be thrown away, and no compensation therefor will be allowed to the Contractor. The Engineer will give especial care to the thorough emptying of all vessels in which mortar may be mixed, carried or deposited, to prevent the use of even the smallest portion that has begun to set.

When cement is delivered to the Contractor, if not immediately used, it must be protected from the weather and kept dry, and in no case will it be allowed to be placed upon the ground without blocking under the barrels. All cement lost or injured by dampness or otherwise after delivery will be at the sole loss of the Contractor.

All mortar must be mixed and wetted in a proper vessel or on tight flooring, and in no case upon the pavement or upon the ground.

CONCRETE.

Where concrete is required it shall be composed of one (1) part of mortar (made as above described) and two and a half ($2\frac{1}{2}$) parts of clean, sharp gravel, or clean stone, free from dust or dirt, and broken so as to pass through a 2-inch ring. It shall be quickly and thoroughly mixed, and deposited in layers of not less than four nor more than nine inches in thickness, and may be settled into its place by slightly ramming, sufficiently to flush the mortar to the surface.

When in place, all wheeling, working, or walking on or over it, must be prevented until it is sufficiently set.

When connection is to be made with any layer, set or partially set, the surface or edge of such layer must be broken, so as to make the joint fresh and close.

All gravel and broken stone that is dusty or dirty will be required to be thoroughly screened and washed before being used, and such piles or heaps as have any admixture of dirt, or of stone above the size specified, will be rejected.

When concrete is laid on a rock surface, this surface must first be thoroughly cleansed and made wet.

PILE AND TIMBER FOUNDATION.

Wherever piles are required for foundations or elsewhere, they shall be furnished of good sound pine or spruce, oak or elm, free from shakes, and all bark and projecting stubs removed. They shall not be less than eight inches in diameter at the smallest end, properly sharpened and shod when required, and shall be driven with a hammer of not less than two thousand pounds weight and with a fall not less than ten nor more than fifteen feet in height, and driven until the pile shall not yield more than one inch under the blow. The tops to be sawn or cut off truly and evenly to the grade furnished.

All sheet piling shall be drawn as the work progresses, unless otherwise ordered by the Engineer. When left in by such order, allowance will be made therefor at the wholesale market rate of the material so left in.

Foundation timber of good pine, spruce or hemlock shall be furnished and laid, where required; the timber shall be sound and free from sap, without cracks or shakes, and squared to the dimensions

required throughout its entire length. When placed upon piles it shall be drift-bolted with proper iron or tree nails. Where bolts are required they shall be furnished of good wrought-iron, headed and sharpened when required, or as directed by the Engineer.

Foundation plank of good pine, spruce or hemlock shall be furnished and laid where and as required. They shall be of the length, width and thickness required, and nailed or spiked to the foundation timbers with the best quality of wrought-iron nails or spikes of proper size and length.

When it may be necessary to lay foundation boards or plank, they shall be of the kind and quality above described, and cut and laid in the manner designated by the Engineer.

All such material not included in the plans and specifications will, when its use is ordered by the Engineer, be paid for at the wholesale market rate.

BRICK MASONRY.

In the construction of brick masonry no brick or cement shall be used except such as shall have been sold to the Contractor by the Board of Sewer Commissioners. Only whole bricks will be used, except in closing circles, all bats being immediately removed from the work. Bricks broken after delivery on the work shall be at the loss of the Contractor.

All bricks shall be thoroughly wet by complete submersion immediately before laying. Every brick shall be laid in a full joint of mortar on its bed, end and side at one operation; in no case is mortar to be slushed or grouted in afterwards.

The invert of the sewer to the spring line shall be worked from templates accurately made according to the dimensions of the sewer and correctly set according to the alignment and grades furnished by the Engineer.

In laying the arch the crown is to be keyed in each layer or ring with stretchers in full joints of mortar. All brick-work as it progresses in the invert and, so far as practicable, in the arch, must be racked back in courses.

Vitrified drain pipes or spurs, to be furnished by the Board of Sewer Commissioners are to be worked into the walls of the sewer as the Engineer may direct, and each pipe or spur is to be closed

outside with brick masonry laid in lime mortar and covered with a skin of neat cement.

The outer ring of the invert up to the center line of the sewer (or spring of the arch) shall be laid and completed by itself in the manner indicated for a length of 200 feet, or for such shorter length as the Engineer shall from time to time prescribe, in advance of the laying of any part of the second or middle ring. The inner surfaces of the bricks must be laid on a true circle having a radius of 4 feet and 9 inches, and with inner joints between the bricks of not over 3-16 of an inch, and this outer ring must be supported by proper backing, as indicated, to within 1 foot of its top; but the upper foot of each side of the outer ring must be left without backing until the second ring shall have been laid to the center line of the sewer, when the backing is to be carried to its top and lightly rammed, as indicated. The inner surface of this outer ring, properly cleansed and wetted, shall be completely rendered with a thin and perfectly smooth plastering of neat Portland cement, laid on with the trowel as the work progresses, but after the joints shall have been properly and smoothly struck. The inner surface of this outer ring so rendered must be kept as clean as possible until covered by the middle ring. If at any time it shows cracks or other imperfections, the Engineer shall direct that the defective portion be made good by repairs or renewal, as he shall deem best, and such repairs or renewal shall be effected at the sole cost of the Contractor.

The middle ring shall be laid in the manner indicated inside of the outer ring in such a bedding of mortar as shall carry the inner surface of its bricks to a true circle having a radius of 4 feet 4½ inches. It shall be laid and completed at least 50 feet, or for such shorter length as the Engineer shall from time to time prescribe, in advance of the laying of any part of the third or inner ring. Its inner surface, properly cleansed and wetted, shall be rendered with Portland cement as directed for the outer ring. It shall in like manner be kept clean, and in case of defect shall be repaired or renewed, if so directed by the Engineer, at the sole cost of the Contractor.

The inner ring shall be laid in the manner indicated, but with bricks of truest form and sharp edges, with inner joints of not more than ¼ inch, inside of the middle ring in such a bedding of mortar as shall carry the inner surface of its bricks

to a true circle having a radius of 4 feet. It shall be laid and completed at least 30 feet, or for such shorter length as the Engineer shall from time to time prescribe, in advance of the setting of the centers for the arch. Its inner surface shall be kept clean, and in case of defect it shall be repaired or renewed, if so directed by the Engineer, at the sole cost of the Contractor.

The centers for the arch of the sewer shall be of such dimensions and so set that brick work laid upon them will, with the invert, complete a true circle of 4 feet radius. The inner ring of brick work shall be laid with full mortar joints smoothly struck on the upper side. Only the best and truest select bricks shall be used for this inner ring, and all inner edges must be straight and sharp. They must be laid to inner joints of not more than $\frac{1}{4}$ inch.

The middle ring shall be laid, as indicated, in a sufficient bed of mortar to bring the outer surface of its bricks to a circle having a radius of 4 feet and $8\frac{1}{2}$ inches, and its joints shall be smoothly struck.

The outer ring shall be laid, as indicated, in a sufficient bed of mortar to bring the outer surface of its bricks to a circle having a radius of 5 feet and 1 inch, and its joints shall be smoothly struck. The outer surface of the arch shall be smoothly rendered with mortar.

The centers shall not be struck until the filling, as indicated, shall have been carried to a height of at least two feet above the top of the sewer.

The centers being struck, all dirt and rubbish being removed from the inside of the sewer, and the whole interior of the sewer being washed perfectly clean, it shall receive, while still wet, a thin and perfectly smooth plastering of neat Portland cement, laid on with the trowel, over its whole inner surface. This plastering must not be soiled, or disturbed, or trodden upon, for at least 48 hours after its application.

In building brick masonry none but careful and skillful bricklayers shall be employed.

When new work is joined to brick masonry on which work has been suspended long enough for the bricks to have become dry, they shall be thoroughly wetted, and the old surface shall be thoroughly cleansed before the brick-laying is recommenced.

BRICK MASONRY LAID IN WINTER.

The laying of brick masonry shall continue throughout the winter, but, whenever in the judgment of the Engineer, it is necessary, as a protection against frost, the mortar shall be wetted up with hot water, and all bricks used shall first be steamed in boxes until raised to a sufficient temperature to prevent freezing before the setting of the mortar.

BACKING AND REFILLING.

As the laying of the outer ring of the sewer progresses from the invert upward to within one foot of the line of the horizontal diameter, the work shall be backed in and carefully packed and rammed by trusty persons, under and around the sewer with proper material and with proper tools, of which the Engineer is to be the judge. In thus filling in under the sewer, the earth or sand shall be faithfully rammed as the work progresses, and in no case shall the number of men back-filling be greater than the number of those ramming, nor shall the layers in any case exceed two inches in thickness. After the middle ring of the sewer shall have been built to the center line, the backing shall be continued in like manner, but only lightly rammed to the height of the brick-work as thus constructed.

After the arch shall have been completed, this lightly-rammed filling shall be thoroughly consolidated by the use of pointed iron rammers, and the further filling from its surface to a height of one foot above the center line of the sewer, shall be of the finest material, applied in thin layers and thoroughly rammed with pointed iron rammers, the work being done by three men, selected by the Engineer, one man filling and two men ramming. In filling the trench, after the completion of the masonry, from a level one foot above the center line of the sewer, use may be made of the material excavated in opening the trench, but no stone more than four inches in diameter may be deposited nearer to any part of the sewer than one foot. In no part of the filling may the proportion of stone to earth be more than as 1 to 3. All of this portion of the filling must be thoroughly and compactly rammed in layers of not more than six inches, in such manner as the Engineer may direct, and such number of rammers and shovels shall be employed as he may direct, in proper proportion to the rapidity with which

earth is deposited. The Engineer may, in his discretion, require any filling to be rammed in wet.

The trench being filled, the Contractor shall cart away or remove from the ground all surplus earth, stone or other material, and leave all roads and places free, clear and in good order; and, in case this is neglected, he will be allowed twenty-four hours only to remove the same, after a written notification of his failure or neglect, after which it will be done by the Board of Sewer Commissioners, at the Contractor's cost and charge.

Should there be a deficiency of proper material for refilling, the Contractor will be required to furnish the same at his own cost and charge.

Concrete backing shall be used wherever ordered by the Engineer, without extra compensation therefor.

STONE MASONRY.

All stone masonry shall be in all respects as shown on the plan of the work and as indicated in these specifications.

All stones used must be of good quality, clean and free from checks or shakes, of good bed and build, and of the general size indicated.

The masonry shall be laid true and by line, with the stones on their natural beds and in full beds of mortar.

No dressing or tooling shall be done upon any stone after it is laid.

All joints shall be thoroughly filled with mortar, and the courses properly leveled up.

A proper alternation of headers and stretchers shall be made to secure a thorough bond throughout.

All face masonry to be of the best quality of limestone, Medina sandstone or granite, perfectly free from checks or flaws, in courses not less than ten inches in height and $2\frac{1}{2}$ feet in depth, and an area of bed of at least 8 square feet. All horizontal beds to be dressed to a $\frac{1}{2}$ -inch joint for their full depth. All vertical joints shall be dressed to a $\frac{1}{2}$ -inch joint for 15 inches back from the face, the face to have a rock dressing, and above the water line a 1-inch tool edge or margin to be driven around each stone. The projections shall not exceed $1\frac{1}{2}$ inch outside of the face of the drafts. The stone to be laid in Portland cement mortar. All

dimension stone to be of best quality of limestone, Medina sandstone or granite, to be hammer-dressed with all edges and angles well defined, and $\frac{1}{4}$ -inch bed and end joints for the full depth, laid in neat Portland cement. The tops of all exposed walls shall be covered with coping-stones, of a depth equal to the thickness of the wall, 10 inches in thickness, and not less than 4 feet in length, of Medina sandstone, dressed to a $\frac{3}{8}$ -inch joint. The top and face to be hammer-dressed. All backing to be of flint-limestone or other stone as durable, the beds to be dressed to a $\frac{1}{4}$ -inch joint and to have an average of 6 square feet of bed. All stones to be well bedded in mortar and settled to place with a heavy wooden maul; spawling will not be allowed under the bed. All stones to be so arranged that no joint will break less than 8 inches, flushed with mortar and scrubbed off complete before the next course is commenced. The mortar in the beds and joints of the face, when completed, to be removed to a depth of 1 inch, and thoroughly moistened and pointed with neat Portland cement.

CONSTRUCTION IN TUNNEL.

The sewer is to be constructed in tunnel between Station No. 137 and Station No. 163.

The whole of this part of the work must include three rings of brick-work, laid in full joints of mortar, and having a total thickness of not less than 13 inches.

Subject to the following requirements, and subject to the approval of the Engineer, of the manner in which all parts of the work are executed and carried on, the Contractor will be allowed the largest liberty in selecting the means for driving the tunnel and for backing and supporting the work. Whatever the method or process adopted, there shall first be constructed a complete sewer, having not less than two rings of brick masonry, laid with full joints of mortar, and having together a thickness of not less than $8\frac{1}{2}$ inches, with the joints properly and smoothly struck, of an interior diameter, of not less than 8 feet and 8 inches, and not more than 8 feet and 10 inches. All voids exterior to the circumference of the sewer shall be properly and solidly filled. As this work is completed all centers and supports of every kind shall be removed, and the sewer so constructed shall be thoroughly cleaned out. Not less than thirty days after such removal of centers and

supports, and after such cleansing, the sewer will be tested as to the accuracy of its form and position. If any part of its inner surface is nearer to the true axis of that portion of the sewer, as indicated, than 4 feet and 4 inches, or further from the said axis than 4 feet and 5 inches, such defective portion must be removed and rebuilt, and left without support for thirty days, to test its stability. After thirty days the distance of the inner surface from the true axis of the sewer will be again measured; and the operation shall be repeated as often as may be necessary to secure a wall that has stood within the prescribed limits of distance from the true axis of the sewer for a full period of thirty days.

No extra compensation, will, on any pretext, be allowed for the renewals of the work above provided for; and it is understood by the parties to the agreement that the sum agreed to be paid is to cover all such expenditures in full.

Accuracy having been secured under this test, there will then be laid inside of the sewer, a third, or inner ring of brick work, laid as indicated for work in open cut with every bed, side and end of every brick laid in a full joint of mortar, and with the joints smoothly and properly struck, having all parts of its inner surface 4 feet from the true axis of the sewer.

This inner ring having been completed not less than 24 hours, all dirt and rubbish shall be removed, the whole interior of the sewer shall be washed perfectly clean, and it shall receive, while still wet, a thin and perfectly smooth plastering, of neat Portland Cement, laid on with the trowel, over its whole inner surface. This plastering must not be soiled, or disturbed, or trodden upon for at least 48 hours after its completion.

The Contractor will be permitted to maintain, until after the completion of the main work, any shafts sunk from the surface of the street to the tunnel. The work being completed, manholes of brick masonry, having an interior diameter of 3 feet, and a thickness of wall of at least 8 inches, the brick-work being laid substantially as indicated for other parts of the work, shall be securely and properly connected with the arch of the sewer as indicated, and shall be carried to within two feet of the surface of the street; from this point such manholes will be gradually narrowed to the diameter required to receive the prescribed manhole head and cover. Such manholes shall be furnished with proper galvan-

ized wrought iron bars, for ladder steps, as indicated, built in at each sixth course of brick.

In filling the shaft around the brick-work of the manhole, proper measures will be adopted to prevent injury to the sewer by the falling in of stones, dirt or rubbish, and the filling shall be rammed in wet to provide against settling.

Any injury to the completed structure from the falling in of substances at the shafts or manholes, or otherwise, shall be completely renewed or repaired, to the satisfaction of the Engineer, at the sole cost of the Contractor.

CONSTRUCTION IN PASSING THE WATER WORKS.

For a distance of 100 feet in passing the Water Works (Section B) the sewer is to be constructed of four rings of brick, instead of three rings, with a thickness of wall of 17 inches and with an exterior diameter of 10 feet and 10 inches.

In preparing the ground for the whole of Section B an excavation will be made to the width of 16 feet from the surface of the ground to the horizontal diameter of the sewer, and below that to at least a half circle with a radius of 8 feet. This excavation will then be filled to the height of the soffit of the sewer to two vertical lines not more than 9 feet apart and below the line of the horizontal diameter of the sewer to a circle having a radius of not less than 4 feet and 6 inches with the best quality of puddling clay carefully and thoroughly puddled, as the Engineer shall direct. As the puddling progresses from the bottom upward the space inside of the 4 feet and 6 inch radius and of the vertical lines 9 feet apart, as above, shall be filled with such earth as the Contractor may select, the same being well compacted to the height of the soffit of the sewer. The whole excavation shall then be filled to the surface and shall remain undisturbed for the space of at least 10 days before being excavated for the construction of the sewer.

The ground being thus prepared, the excavation shall be made and the sewer and the drain under it shall be constructed in exact accordance with the specifications for the construction of the main line of the sewer, save that for a distance of 100 feet, as above, and as shown in the plan, the walls are to be 4 rings (17 inches) thick, as above.

FOUR-FOOT SEWER.

The 48-inch sewer connecting the Mill-Race Sewer with the head of the junction of the Hamburg-street inlet shall be constructed in exact accordance with the requirements for the construction of the 8-foot sewer, with modifications as to size, grade and thickness, as shown by the drawings. Its connection with the Mill-Race Sewer and the stone work in connection therewith shall be in all respects as shown in the drawings, and shall be constructed in substantial accordance with the spirit and tenor of the general specifications of other parts of the work.

FLUSHING INLETS, ETC.

The channels connecting the flushing-gate chambers with the junction chambers of the Trunk Sewer shall be constructed in all respects in accordance with the specifications for the construction of the Trunk Sewer, as modified by the indications as to size shown in the drawings.

The junction chambers by which these channels are connected with the Trunk Sewer, including the cut-stone masonry connected therewith, shall be constructed in substantial accordance with the specifications as relating to other work of a similar character, especial care and exactness being required for the cut-stone work.

The gate chambers shall be built as shown by the drawings and in the manner, as to brick and stone masonry, as indicated in the specifications, special care being required with reference to all dimension stone.

The gates shall be properly constructed of white oak wood, composition metal and galvanized iron, as shown in the drawings, and shall be properly set in place.

INTERCEPTION OF EXISTING SEWERS.

The interception of existing sewers indicated in the list of division of the work into sections shall be carried on, so far as excavation and construction are concerned, in precise conformity to the requirements of the specifications for the construction of the Main Sewer, with the differences of size, number of rings of brick, form of construction, stone work, etc., as indicated by the drawings.

Each inlet sewer will be connected with the Trunk Sewer by cast iron pipes, as indicated by the drawings, which pipes are to be purchased from the Board of Sewer Commissioners.

Manholes indicated in connection with the interception works will be made as indicated and generally as required for all manholes on the work.

In the drawings the intercepted sewers are shown as crossing the Trunk Sewer at right angles. They will be constructed on such angles as the present lines of such sewers make necessary. The center point of the iron inlet pipe shall coincide vertically with the axis of the intercepted sewer, the distance between this point and the intersection with the axis of the main sewer varying according to the angle. All new work shall be made to conform, at its point of junction, with the size and form of the sewer to be intercepted.

The distance from the Trunk Sewer to the point at which the existing sewer is to be intercepted is shown on the plans of the work, and new construction to this point is included in the interception work to be contracted for.

MANHOLES.

Brick manholes shall be built at the points indicated on the line of the sewer, intercepting sewers and inlets. The brick-work will be carried up to within 2 feet of the established grade of the street at that point and from templates correctly made and set at top and bottom, whence not less than 12 lines are to be drawn. The work shall be in all essential respects as described in these specifications for brick-work. Galvanized wrought iron rods of good quality, and of size, length and shape as indicated, are to be built in at each sixth course of the brick work for ladder steps.

A cast iron manhole head and cover, weighing together 600 pounds, and supplied by the Board of Sewer Commissioners, shall be properly fitted to each manhole. One foot of brick-work shall be carried up from the top of the manhole, as indicated, drawn in to the proper size to receive the manhole heads.

The manholes are in all cases to be fully and completely built and fitted with their covers as the work progresses and as each is reached.

The Engineer may locate a manhole at each junction of the Trunk Sewer with an intercepting sewer, or with a street, and at intervals of 500 feet elsewhere on the Trunk Sewer, on the intercepted sewers, and on the inlets, wherever the foregoing would leave intervals of more than 600 feet. All such manholes shall be built without additional compensation being paid therefor to the Contractor.

CONNECTION OF SEWERS AND DRAINS.

The Board of Sewer Commissioners shall have the right to connect any sewer or sewers or any drain or drains with the Trunk Sewer or its inlets, or to grant permits to any person or persons to make connections therewith at any time before it is finally completed; and the Contractor shall not interfere with or place obstructions in the way of such persons as may be employed in building such sewer or sewers or in making such connections. No extra allowance will be made to the Contractor on account thereof. It is understood, however, that no sewer or drain connected with the Trunk Sewer, or its inlets, shall be allowed to discharge its contents therein when such discharge would interfere with the Contractor, or entail additional cost in the execution of the work.

REGRADING, REPAVING, ETC.

All paving stones and road metal necessary to be removed shall be placed in such parts of the carriageway, or the vicinity thereof as the Engineer shall direct, leaving, in all cases, a sufficient passageway on the sidewalks free from all obstructions. In the progress of the work north of Station 80, the Contractor will be required to preserve, from needless obstruction, a carriageway on one side of the line of the sewer, and also to afford the necessary facilities for travel and transport to residents along the line and to the public, without extra charge therefor.

The carriageway on the line of the work to be regraded and repaved or remacadamized or reconcreted, as the case may be, to the extent which the aforesaid work may render necessary. The Contractor will be required to reset all curb, gutter, bridge and flag-stones which may have been displaced during the prosecution of the work, under this agreement; and in case any of said stones shall have been broken in consequence of any act or omission on the part of said Contractor or his agents, new stones, to be approved by the Engineer, shall be furnished and set in place thereof, by the Contractor, at his own expense, prior to the acceptance of the work by the Engineer.

Immediately after the filling of the trench over the completed sewer, the surface of the street, walk or other site of the sewer, shall be restored to its original condition in a manner approved by the Engineer.

STREET RAILWAY TRACKS.

The Contractor shall, at his own expense, remove and lay in a proper manner during the construction of the work, and replace, from time to time as the work progresses, all street railway tracks on which traffic would be interfered with by the prosecution of his work.

In the case of double-track street railways the Contractor will be allowed to provide switches, by which to throw the traffic on to a single track, at one side of the line of the sewer, for a length that shall, in no case, exceed one thousand (1,000) feet. Immediately after the completion of his work he shall restore all such tracks to their original condition, or to a condition acceptable to the railway company.

MAINTENANCE AND COMPLETION OF THE WORK.

During the progress of the work, and until its full completion and final acceptance, the sewer and its appurtenances are to be kept thoroughly clean and in good order.

Upon the full completion of the work, the Contractor will be required to file, in the office of the Board of Sewer Commissioners, a certificate, signed by the Engineer, to the effect that the stipulations relative to the removal of all surplus materials, earth, sand, rock and rubbish from the line of work, and relative to the cleaning and maintaining of the sewer and its appurtenances, have been faithfully complied with.

INSPECTION.

All the work contemplated and described in this contract shall be done to the satisfaction of the Engineer, who shall be sole judge as to the fitness of material and workmanship, and he shall have the right to correct any errors or omissions in the contract and specifications, when such corrections are necessary for the proper fulfillment of their intention, the operation of such correction to date from the time the Engineer gives due written notice thereof. Any unfaithful or imperfect work that may be discovered before the final acceptance of the work shall be corrected immediately, and any unsatisfactory materials delivered shall be rejected and removed on the requirement of the Engineer, notwithstanding that they may have been overlooked by the Inspector, and estimated

and paid for. The inspection of the work shall not relieve the Contractor of any of his obligations to perform said work as herein prescribed, and all work of whatever kind, which, during its progress, and before it is finally accepted, may become damaged from any cause, shall be replaced by good and satisfactory work without extra charge therefor.

CONDEMNED MATERIAL.

Any material condemned or rejected by the Engineer or the Inspector may be branded or otherwise marked, and shall in all cases be at once removed from the work.

SUSPENSION OF WORK.

Upon the suspension of work from any cause the trenches shall, when required by the Engineer, be refilled, repaved, or remacadamized and reconcreted, as the case may be, and all materials, surplus earth, sand, rock and rubbish removed from the street immediately thereafter; and in case of failure after due notice has been given in writing by the Engineer to the Contractor it will be done by the said Board of Sewer Commissioners, and the expense thereof shall be deducted from the payments due or to become due the Contractor.

All masonry shall be covered and protected from frosts or flooding by and at the expense of the Contractor, to prevent injury from water or from freezing.

ESTIMATES.

Estimates will be made monthly, the same being the Engineer's measurements of work completely constructed and accepted since the preceding monthly measurement, and all payments shall be made by warrants drawn on the City Treasury (Trunk Sewer Fund).

MONEYS TO BE RETAINED.

Twenty per cent. (20 %) of each payment due to the Contractor shall be retained by the Board of Sewer Commissioners until the amount so retained shall equal ten per cent. (10 %) of the total sum for which he shall have contracted to do the whole work of the

contract; such amount to be retained until the final completion of the work and its acceptance by the Engineer, to secure full and faithful compliance with these specifications. Where the work done has involved the repaving of the street by the Contractor, a sufficient portion of the money retained will be held by the Board of Sewer Commissioners for the period of six months to secure compliance with the following requirement:

It is understood that if at any time during the period of six months from the date of the final completion and acceptance of the sewer, the carriageway or sidewalks on the line of the same shall, in the opinion of the said Board of Sewer Commissioners, require regrading and repaving, or remacadamizing and reconcreting, and the said Board shall notify the Contractor to make the repairs so required, and if the said Contractor shall neglect to make such repairs to the satisfaction of the said Board within twenty-four hours from the date of the service of such notice, that then the said Board shall have the right to employ such other person or persons as they may deem proper to make the same, and to pay the expense thereof out of the sum retained for that purpose by the said Board, as before mentioned. The said Board of Sewer Commissioners agrees, upon the expiration of the said period of six months, provided that the said carriageway shall at that time, in its judgment, be in good order, to pay to the said Contractor the whole sum retained, or such part of the said sum as may remain after the expenses of making the said repairs in the manner aforesaid shall have been paid therefrom.

And it is further understood that if the termination of the said period of six months after completion and acceptance of the work done under this agreement shall fall within the months of December, January, February or March, then, in that case, the said months of December, January, February and March, or such part thereof as the Engineer may determine, shall not be included in the computation of the said period of six months.





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